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2003 Distributed Energy Resources Peer Review
National Accounts Energy Alliance

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American Gas Association

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NAEA Program Review

- NAEA at-a-glance
- Project description and goals/objectives
- Project Team/Partnerships
- Task definition and activities by task
- Milestones completed and planned
- Key technical barriers and success strategies
- Project risks
- Impact on Distributed Energy Program goals
- Summary

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NAEA at-a-glance

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NAEA Strategy

- Broad consortium of relevant stakeholders
- “Open protocol” approach
- Apply and evaluate energy efficient, integrated systems to “real environment” sites
- Build on existing customer relationships and customer survey data to further understand customer “environments”
- Utilize industry “influencers” in getting technologies to market
- Build clear communications and trust among stakeholders

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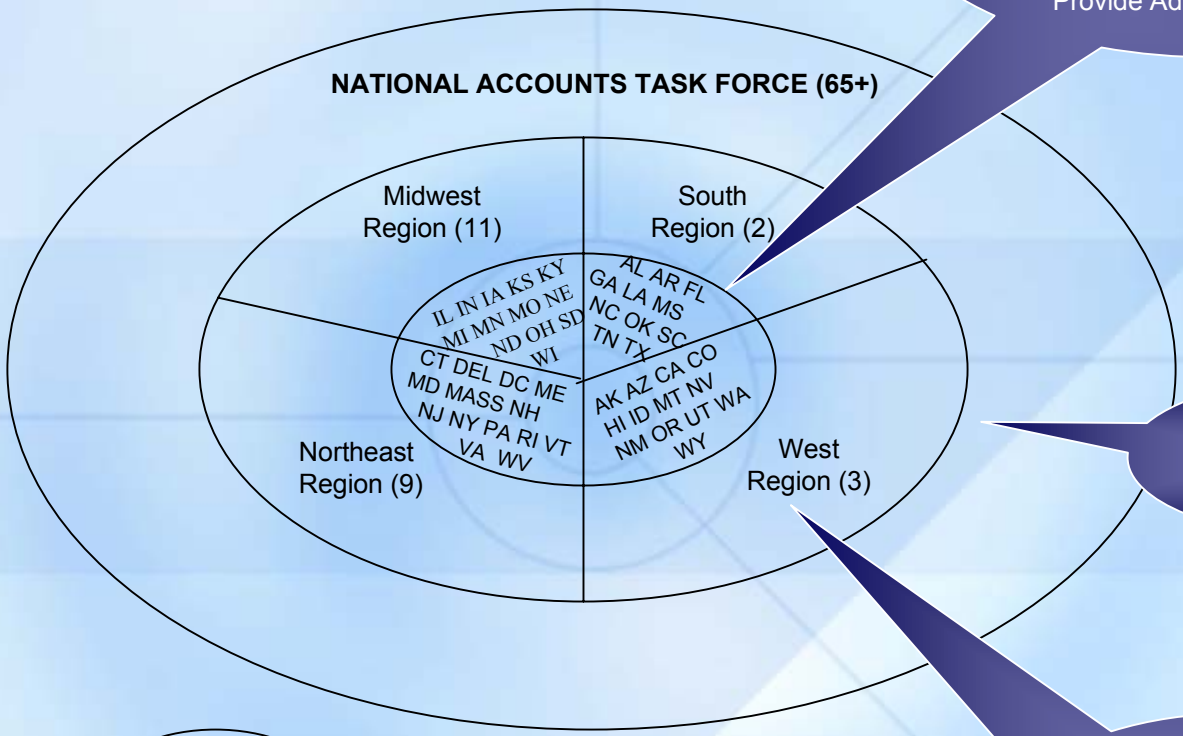
NAEA at-a-glance

Structure



AGA National Accounts Liaisons (2)

Manage and Promote Successes
Maintain www.TheGasChoice.com
Provide Administrative Support

Active National Accounts Task Force Members (65+)

National Accounts Task Force Teams (5)

Corporate Energy
Communications
Products & Services
Sales
Venue

National Accounts Customer Advisory Board (23) /

National Accounts Manufacturer's Council (12)

National Chain Feedback
Manufacturer's Feedback

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NAEA at-a-glance

Partners

Public Sector
- DOE
- ORNL
- State Governn

Energy Supplier
- Natural Gas LI
- Electric LDC's
- ESCOs

Industry
- GTI
- Manufacturers
- Integrators

Chain and National Accounts
- Supermarket
- Restaurant
- Healthcare
- Lodging
- Retail

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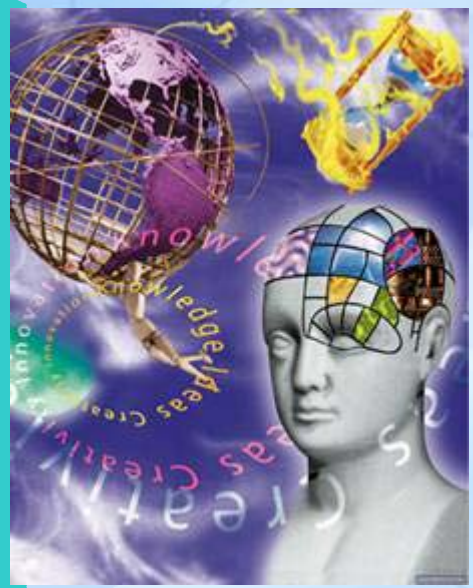
NAEA at-a-glance

Building Knowledge Network



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Relevance

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Project description and goals/objectives

Penetration of combined heat and power AKA cooling, heating and power "CHP" systems into commercial and institutional markets has been minimal to-date. This should not be surprising in light of:

- **Product immaturity of small CHP technologies and systems**
- **Little familiarity of users, building owners and specifiers about CHP systems and benefits**
- **Lack of field data on CHP systems and applications**
- **Lack of an adequate sales and service infrastructure for small systems**
- **Critical market and regulatory hurdles**

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Relevance

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Project description and goals/objectives

NAEA field research, test and verifications projects provide independent assessments designed to increase the technical understanding of applied CHP systems with the final object of increasing the market acceptance and penetration of clean and efficient CHP technologies by reducing the perceived and real risks by:

- **Performing field research, testing and verification of new DE and CHP systems across targeted sectors of the economy (key vertical markets);**
- **Documenting institutional impediments such as utility interconnection, standby service tariffs, and siting and permitting and suggest remedies; and**
- **Increasing leveraged end-user (national, regional account or institutional account), DOE Application Center, specifier, CHP manufacturer and integrator, local policymaker and utility awareness.**

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Relevance

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Project description and goals/objectives

Targeted Vertical Markets

- Food distribution (Supermarkets)
  - Waldbaums, Hauppauge, NY
  - HEB, Texas
- Hospitality (Hotels / Resorts)
  - Quality Inn, Minneapolis MN
- Retail (humidity sensitive – cinemas, drug stores, humid climates)
  - Cinemark, Plano, TX
  - Walgreens, Pinellas Park, FL
  - Kohls, Long Island, NY
- Healthcare (specialty operating centers, therapeutic pools, etc.)
  - Future
- Education (university and secondary education)
  - Future

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Relevance

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Project description and goals/objectives

Site	CHP Application	Power	Thermal
Waldbaum's Supermarket	Power plus winter heating and summer dehumidification	Capstone 60 kW	Munters Dehumidifier
Cinemark 20-Screen Cineplex	Power plus theater dehumidification (mathematically coupled)	55 kW DTE Stirling Engine	2 – SEMCO Integrated Active Desiccant Modules
200 Market Street Office Building	8,760 Power plus winter heating & summer cooling	Capstone 30 kW	Unifin heat exchanger and Yazaki 10 RT Chiller
Quality Inn & Suites	Power plus absorption cooling	95 kW Baldor generator	2 –Enthalpy wheel make-up air units, hot water for heating, laundry and DHW

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Project Team/Partnerships

National & Regional Accounts

Utilities

Manufacturers

Leverage

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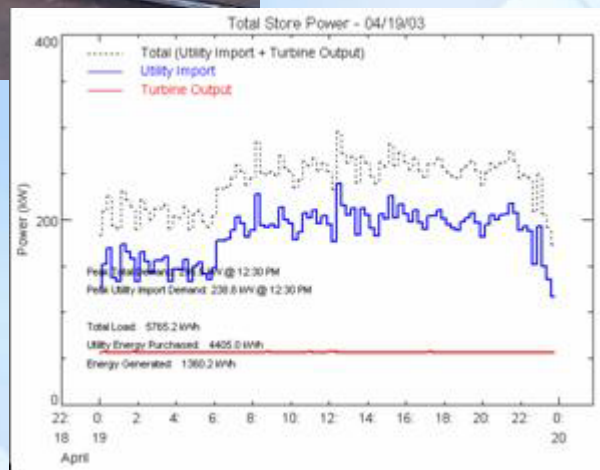
Task Activities

A&P/ Waldbaum's – Long Island, NY

A Capstone 60 kW microturbine is being integrated with a 20,000 cfm Munters air handling unit that is currently part of A&P's standard store design. The Munters unit provides cooling and heating to the main sales areas of the store. The unit also includes a desiccant section to provide dehumidification. A Unifin heat exchanger will be installed to recover heat from the microturbine exhaust that can be used to provide both space heating and desiccant regeneration.



Project Status

Commissioned September 2002

Operation started April 18, 2003 due to interconnection delays

The heat recovery operation raised the system efficiency by over 20%

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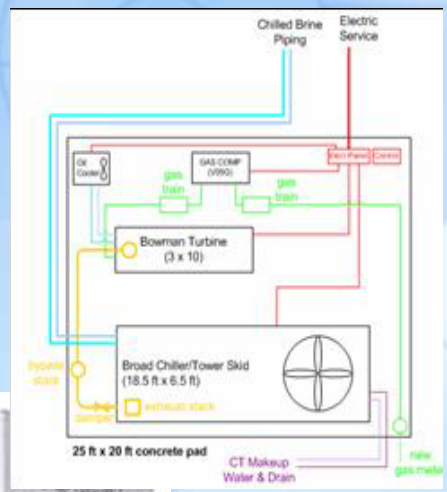
Task Activities

HEB – TX

The system consists of a Bowman 80 kW Microturbine and a Broad exhaust gas fired single-effect Li-Br absorption chiller. The system will have a nominal electrical rating of 80 kW and the capacity to provide 22 RT of 41 °F leaving chilled brine temperature at standard conditions. This installation will test the viability of providing liquid refrigerant subcooling to four Hussmann refrigeration systems. The four rooftop mounted refrigeration units each have a compressor house with an attached air-cooled condenser. Water-to-refrigerant heat exchangers need to be installed in the refrigerant liquid line under each air-cooled condenser to provide subcooling.



Project Status

Site Agreement April 2003

Bowman microturbine onsite

Broad chiller expected onsite

Foundation to be completed November

Commissioning expected December

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Task Activities

Cinemark – Plano, TX

One wing of this facility (seven theaters) will be retrofitted with 2 SEMCO integrated active desiccant modules (IADM) and instrument and the other wing served by the conventional systems will also be instrumented as a control. This theater will also be the first commercial test site in the world for a Stirling Engine and a desiccant dehumidification system. This test will provide the opportunity to investigate CHP systems (mathematically linking the engine and dehumidifiers) for dehumidification effectiveness, reliability and electric grid demand reduction.

Project Status

Site Agreement May 2003

SEMCO two IADM onsite

SEMCO installation & operation December 2003

DTE 55 kW Stirling Engine installation & commissioning April 2004

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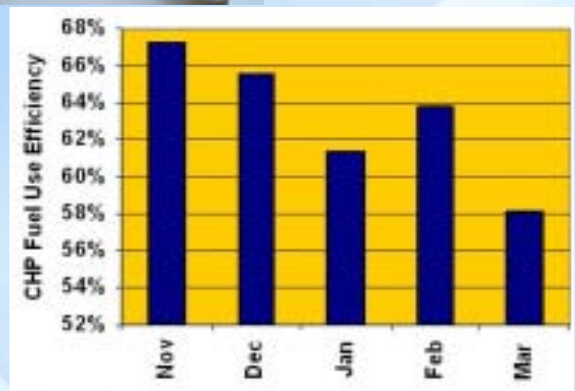
Task Activities

200 Market Street – Portland, OR

A 30-kilowatt Capstone microturbine generates electricity for emergency and night lighting circuits for the entire office facility.

All available waste heat microturbine is being reclaimed through an exhaust-to-water heat exchanger.

All the hot water generated from waste heat reclaim is used either directly for space heating or to generate chilled water through a hot water absorption chiller.



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Task Activities

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Walgreen's – Pinellas Park, FL

Oak Ridge National Laboratory and SEMCO have been working on a novel natural gas/or recovered heat (CHP) regenerated Integrated Desiccant Module (IADM) solution for Retail Stores. The IADM is a direct replacement for a rooftop unit except the IADM is capable of providing the space with all the latent capacity need and a portion of the sensible capacity allowing other rooftop units to provide the remainder of the sensible cooling. A natural gas-fueled GENERAC Power System's DG50 (50 kW) will also be installed to reduce the store's energy demand. This test will provide the opportunity to investigate in a fast growing retail store segment CHP systems (mathematically linking the engine and dehumidifiers) for dehumidification effectiveness, reliability and electric grid demand reduction.

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Task Activities

Kohl's – Long Island, NY

This project will evaluate the benefits derived by installing a natural gas engine generator with 80 tons of liquid desiccant dehumidification. The natural gas engine's jacket water and exhaust will be recovered in the form of hot water which will be use regenerate the liquid desiccant units that remove moisture from outdoor air prior to entering eight rooftop units.

Project Status

Site Agreement November 2003

Installation & operation March 2004

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Task Activities

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Quality Inn & Suites – Minneapolis, MN

The Quality Inn & Suites will consist of three core technology elements: power generation, desiccant drying, and absorption cooling, all coupled in a tightly integrated package.

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Accomplishments

Milestones completed and planned

Expected Delivery	Status	Milestone
June-02	Completed	200 Market Street Program Development and Data Collection Plan
June-02	Completed	HEB Program Development and Data Collection Plan
June-02	Completed	McDonalds Program Development and Data Collection Plan
October-02	Completed	200 Market Street Final Installation Design Review Meeting Report
December-02	Completed	200 Market Street Initial Data Acquisition Report
February-03	Completed	HEB Final Installation Design Review Meeting Report
March-03	Completed	Cinemark Program Development and Data Collection Plan
May-03	Completed	Cinemark Final Installation Design Review Meeting Report
May-03	Completed	McDonalds Final Installation Design Review Meeting Report
November-03	Completed	200 Market Street Final Report
December-03	Completed	Walgreens Program Development and Data Collection Plan
December-03	-	Cinemark Initial Data Acquisition Report (Desiccant only)
January-03	-	Walgreens Final Installation Design Review Meeting Report
February-04	-	HEB Initial Data Acquisition Report
March-04	-	Walgreens Data Acquisition Report
January-05	-	Cinemark Final Report
March-05	-	HEB Final Report
April-05	-	Walgreens Final Report

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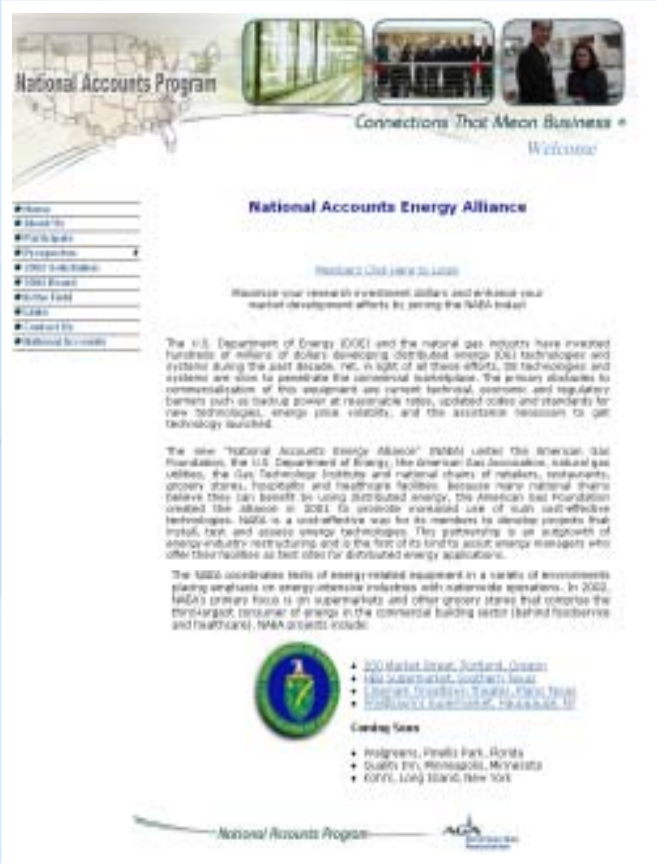
Accomplishments

Milestones completed and planned



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Technology & Application Knowledge Transfer

- **The core knowledge derived from the field research, test and verification projects are efficiently leveraged through the transference of data and analysis to the following partners:**
  - **Detailed application performance and interface data and results are quickly disseminated to systems integrators, manufacturers and host sites to actively integrate the findings into product plans, building designs and operating schemes.**
  - **Generalized performance information, barrier identification and resolution and case studies (when projects are completed) are widely disseminated via monthly reports and the NAEA website.**
  - **The material is further used to create presentation that are given annually at the AGA National Accounts Conference, vertical market conferences (ASHE, FMI, HMA, etc.) delivered to the NAEA national account, utility and manufacturer member base.**

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Planning & Strategy

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Key technical barriers and success strategies

- Component equipment reliability
  - Identify component issues
  - Provide manufacturers with feedback
- Equipment integration issues
  - Identify system issues
  - Provide manufacturers and system integrators with feedback
- Grid interconnection issues
  - Identify specific interconnection issues
  - Provide policymakers, manufacturers and utilities with feedback
- Power electronics sensitivity
  - Identify grid sensitivity
  - Identify building sensitivity
  - Provide manufactures feedback

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Key technical barriers and success strategies

- Building interface issues
  - Identify actual interface electric losses
  - Quantify all parasitic losses
  - Suggest interface improvements
- Electric and thermal load matching
  - Provide detailed load profile data
  - Provide CHP / building load performance
- Regulatory
  - Report actual air quality permitting process
  - Report actual project permitting process
- Natural Gas Price Volatility
  - Explain fundamentals of energy pricing
  - Logically project the future

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Assessment

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Project risks

- **Executing Site Agreements with owners**
  - Finalizing actual terms and conditions can be problematic
  - Flexibility and ability to secure alternative projects is essential
- **Interconnection**
  - Even test and verification projects difficult to interconnect
  - Ability to work with local utilities, chain accounts, State Energy Offices and DOE Application Centers can make the difference
- **Results**
  - While the projects are designed to optimize CHP approach in the selected vertical markets, results may not be less than projected
  - The above result remain very valuable as it delineates actual performance

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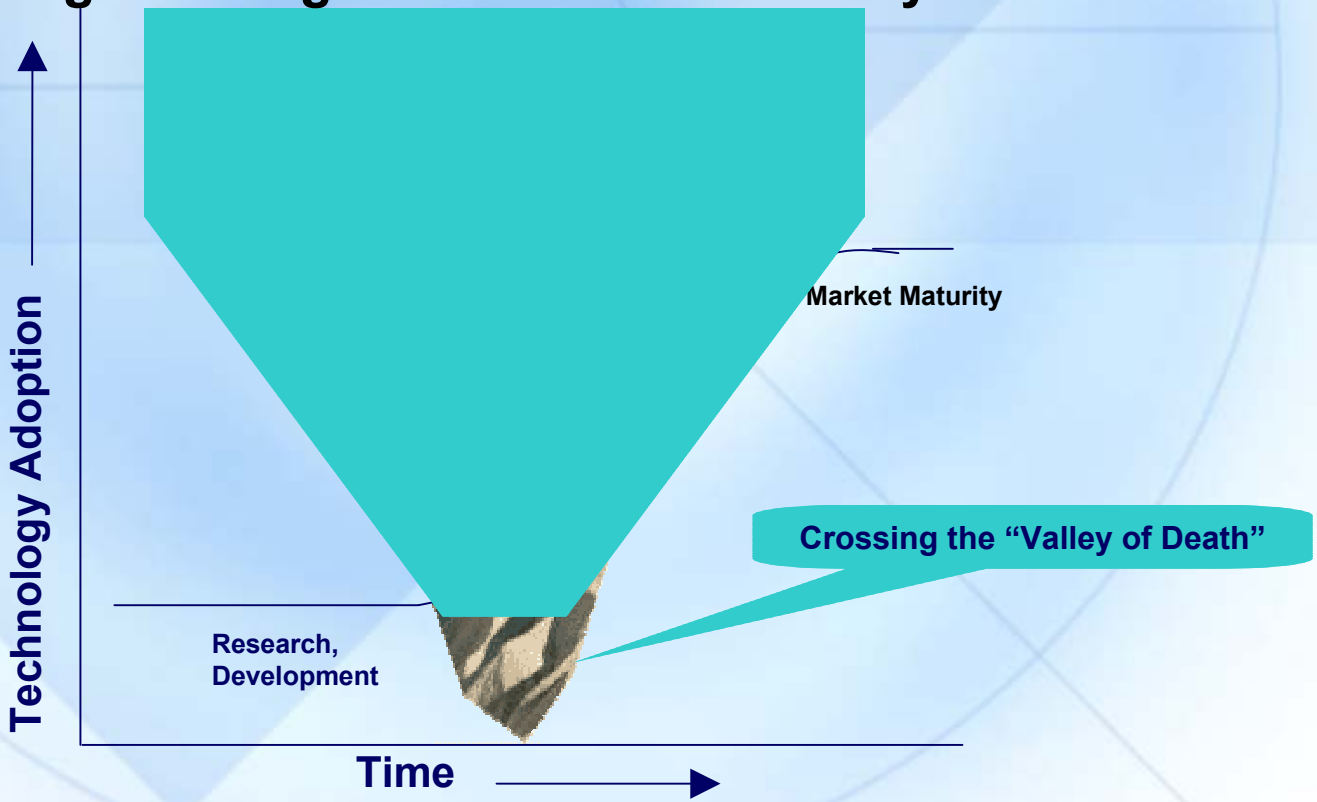
Impact

Impact on Distributed Energy Program goals

New energy technologies often fail in the critical transition phase moving from developed product to commercially viable product. NAEA Test and Verification Projects provide essential field information and technology tools enabling crossing of the so called "Valley of Death".



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Adaptation & Leverage

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Summary

- Continue work with private sector to develop CHP test and verification projects that will act as beacons of innovation and economic reality centered on advanced CHP system design
- Test and verify small (< one megawatt) advance integrated CHP systems is targeted vertical markets
- Provide Field Research, Test and Verification Project feedback to all appropriate stakeholders
- Institute through utilities, manufacturers, DOE and DOE regional CHP Application Centers strong and in-depth technology and application centered material based on the Field Research, Test and Verification Projects

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Questions